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AUTHOR Gardner, John A.
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INSTITUTION Ohio State Univ., Columbus. National Center for Research in Vocational Education.
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ABSTRACT

This study extends previous research on labor market effects of vocational education by estimating the relationship between vocational education in high school and the intervening factors in its relationship to labor market outcomes. The strategy is to use data from a stratified national longitudinal survey to estimate a simplified, reduced-form model of outcomes for individuals that can contribute to understanding why positive earnings effects have been hard to find for men and why the effects vary between men and women. The estimated model shows that (1) vocational education may have both direct and indirect effects on earnings, income, and unemployment; (2) the indirect effects operate through such intervening factors as unionization, industry, occupation, labor market experience, and postsecondary education; and (3) the indirect effects differ between men and women and between whites and nonwhites. The relatively small total effects on males' earnings are more likely attributable to imprecise specification of curricula and neglect of the importance of finding training-related work than to tendencies for conflicting indirect effects to offset each other. Training-related placement is a significant distinction in estimating earnings differentials. Benefits are attributable to occupationally specific skills rather than general work habits or attitudes. Four policy implications are suggested. (YLB)

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INFLUENCES OF HIGH SCHOOL CURRICULUM ON DETERMINANTS OF LABOR MARKET EXPERIENCES

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The National Center for Research in Vocational Education
The Ohio State University
1960 Kenny Road
Columbus, Ohio 43210

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I

As national economic policy has placed increasing emphasis on microeconomic solutions to labor market problems, interest has grown in measuring the labor market effects of secondary vocational education.* Recent efforts to measure those effects by applying rigorous statistical analysis to national survey data have found two results that seem to be consistent across the studies and to be puzzling to researchers and policy-makers.

- First, the evidence is mixed as to whether male vocationally educated high school graduates (especially white males) earn significantly more per hour or per week than otherwise similar nonvocational graduates.
- Second, the effect of secondary vocational education on the hourly or weekly earnings of women in commercial or office specialties is more consistently and significantly positive than for men.

This paper extends previous research on labor market effects of vocational education by estimating the relationship between vocational education in high school and the intervening factors in its relationship to labor market outcomes. The strategy is to use data from a stratified national longitudinal survey to estimate a simplified, reduced-form model of outcomes for individuals that can contribute to understanding why positive earnings effects have been so hard to find for men, and why the effects vary between men and women.

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*See Mertens et al. (1980) for a summary of studies reported between 1968 and 1979 that attempted to measure such effects. See Woods and Haney (1981) for a summary that includes studies from 1980 and early 1981.

The estimated model shows that vocational education may have both direct and indirect effects on earnings, income, and unemployment; that the indirect effects operate through such intervening factors as unionization, industry, occupation, labor market experience, and postsecondary education; and that the indirect effects differ between men and women and between whites and nonwhites.

In section II we review the findings of earlier studies; suggest that distinguishing among direct, indirect, and total effects may enhance our interpretations of the findings; and explain our choice of specific indirect effects for examination. Section III describes the data that were used to estimate direct, indirect, and total effects and the reduced-form OLS equations, logit, and Tobit estimators that were used to obtain consistent estimates of those effects. In section IV we present the estimated effects and note the differences among race-gender subgroups in the sample. Finally, in section V we state our conclusions and discuss the potential policy implications of our findings.

II

The findings cited in the introduction regarding the labor market effects of vocational education explain our concern to contrast direct and indirect routes of effects. The research questions grow directly from the anomalies that are apparent in a more detailed consideration of these findings.

First, the evidence is mixed as to whether male vocationally educated high school graduates (especially white males) earn significantly more per hour or per week than otherwise similar non-vocational graduates. Grasso and Shea (1979) found no significant effects on hourly earnings in an analysis of data from the National Longitudinal Survey of Labor Market Experience (NLS-LME) data. Black male vocational graduates even appear likely in those data to earn less than other black males, though the difference is not statistically significant. Similar results using the same data were reported by Gustman and Steinmeier (1981) and Mertens and Gardner (1981). Meyer's (1981) analysis of data from the National Longitudinal Study of the High School Class of 1972 (Class of '72) survey found only small earnings effects for vocational education for men. They are statistically significant only for specialists in the trade and industry area, and for them, only in one year (1973) during the period of estimation (1973 - 1979). Gustman and Steinmeier and Mertens and Gardner found similar effects in their analyses of those same data. For hourly earnings Mertens and Gardner reported disadvantages for male business specialists, advantages for marketing (distributive

education) specialists, and mixed results for trade and industry specialists. Reanalyses of Class of '72 data by Woods and Haney usually showed white male vocational graduates earning less than comparable general curriculum graduates, though the estimates were seldom significant. They did report a more consistently significant positive pattern of effects for black men who specialize in trade and industry. In a study using an especially designed survey of younger adult workers, Mertens and Gardner found earnings advantages that were statistically significant only for a small group of specialists in marketing (distributive education).

In studies of the NLS New Youth Cohort (NLS Youth) neither Rumberger and Daymont (1982) nor Campbell et al. (1981) could find convincing evidence of consistent and significant positive earnings effects among men with twelve or fewer years of education. Rumberger and Daymont found that additional vocational credits were associated with higher hourly earnings if the credit was earned in a program that had provided skills that were being used on the respondent's job. Additional credits in vocational courses that were not related to the job reduced hourly earnings. However, whether the vocational coursework was expressed as total credits or as a proportion of total courses taken, the estimated effects of job-related courses were not significantly different from zero. Campbell et al. found that a pattern of greater concentration in vocational education was associated with slightly (not statistically significant) lower earnings per week for men.

Second, the effect of secondary vocational education on the hourly or weekly earnings of women in commercial or office specialties is more consistently and significantly positive than for men. Grasso and Shea found statistically significant, positive earnings effects for women who had training in commercial or business/office courses. In the Class of '72 and NLS-LME data sets, Meyer, Gustman and Steinmeier, and Mertens and Gardner similarly found significantly higher earnings (hourly and weekly) for women who took vocational courses in the business/office area. Reanalyses by Woods and Haney of Class of '72 data show strongly positive effects for white women, somewhat less significant (but always positive) for black women. Campbell et al. found strongly significant earnings advantages for women (especially minority women), and Rumberger and Daymont reported similar findings for the NLS Youth. The only apparent sources of disadvantage in earnings for women were so unimportant as to barely merit mentioning: specialization in home economics* (found in Meyer's study) or vocational courses not used on the current job (in Rumberger and Daymont).

Third, the longer the period to which the earnings measure applies, the greater are any apparent advantages associated with secondary vocational training either for men or women. Although advantages in weekly or hourly earnings for male vocational graduates are very difficult to detect, both Conroy (1979) and Li

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*Includes both occupational and nonoccupational home economics courses.

(1981) reported advantages in annual labor income for men. Gustman and Steinmeier also found a statistically significant advantage in male annual labor income, but only for specialists in the trade and industry area. Meyer found that any advantages for women in hourly earnings were magnified in weekly earnings and annual labor income by the longer hours per week and the more weeks per year that women vocational graduates worked. Rumberger and Daymont did not estimate equations for weekly or annual earnings. However, their findings of significantly longer hours worked (for both men and women) and (usually)* fewer weeks per year unemployed suggest that they would have found results for weekly and annual earnings in the same direction as those of Meyer and Gustman and Steinmeier.

The findings of previous research are summarized here somewhat differently than they are by Woods and Haney (1981). Their review suggests, although they do not explicitly acknowledge this in their discussion, that regression analyses show significant advantages for male vocational graduates less frequently, and significant earnings advantages for women more frequently, than do simple descriptive comparisons of average earnings. Since regression analyses, if properly done, should provide better estimates of any effects of vocational education, the current authors are inclined to attach more weight to those

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*They found that more vocational credits reduce unemployment. But a higher proportion of vocational credits reduce unemployment for women by only a small amount and actually increase it for men.

results and less to the descriptive studies (which show positive differentials more often) than do Woods and Haney. This difference in emphasis explains the conclusions here that the differences between men and women in estimated effects of vocational education are somewhat sharper than are protrayed by Woods and Haney.

Moreover, Woods and Haney point out that stronger evidence of positive earnings effects is found for men when participation in vocational education is identified by self-report than when it is identified by coursework. Their own reanalyses of the Class of '72 data support that difference. It is argued elsewhere by colleagues at the National Center that accurate specification of coursework from transcript data more appropriately identifies curriculum (Campbell, Orth, and Seitz 1981). Attaching greater weight to regression analyses based on coursework again leads to a sharper contrast between estimated effects for men and women than Woods and Haney offer.

The failure to find consistent effects for men on short-term measures of earnings, the differences in apparent effects for men and women, and the sensitivity of estimated effects to the time unit of measurement may possibly be explained, at least in part, by an improved understanding of the factors that mediate the effect of vocational education in labor market outcomes.

To investigate those intervening effects, we posed these questions:

- Can the relatively small total effects on the earnings of men be explained by a tendency for individually important indirect effects to offset each other?

- How much of an effect on earnings and unemployment does each of the intervening factors have?
- What are the differences between men and women in the indirect effects that operate through each intervening factor?
- How large are the direct and total effects of vocational education on earnings and unemployment?
- Which of the intervening factors are susceptible to changes in public policy, and what policy changes are suggested by the estimates found here?

The key distinction here is that among direct, indirect, and total effects. Figure 1 may help to clarify that distinction. It shows that an outcome measure such as hourly earnings, Y, may be influenced directly by both high school curriculum, V, and an intervening factor such as educational attainment, A. These relationships are indicated by the path from V to Y and from A to Y. Educational attainment, in turn, may be influenced by high school curriculum, as indicated by the path from V to Y. The influence of curriculum on educational attainment provides a source of indirect effect of curriculum on earnings, an effect that operates through A. The total effect of curriculum on earnings is the sum of the direct effect and all indirect effects (through tenure, occupation, etc.).

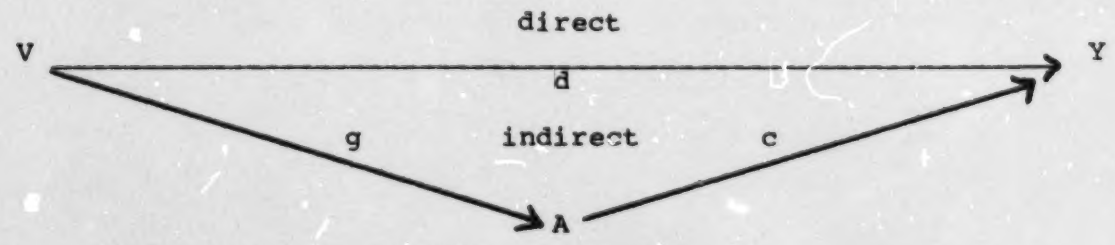

Figure 1. Direct and Indirect Effects on an Outcome

In analytical terms, the model can be written as a two-equation system:

$$Y = a + bX + cA + dV + n \qquad (1a)$$

$$A = e + fX + gV + u \qquad (1b)$$

where X is a vector of other factors that may influence either Y or A or both and n and u are random variables reflecting unobservable influences. In this representation, d is the magnitude of the direct effect of curriculum on the outcome, and cg is the indirect effect that operates through A. Substituting for A in (1a) gives the reduced-form equation for Y:

$$Y = (a+ce) + (b+cf)X + (d+cg)V + (n+cu) \qquad (1c)$$

The coeffecient of V in the reduced-form is the total effect, d + cg.

This simple model illustrates the problem in interpreting estimates of effects of vocational education. If one estimates (1a) only, the estimate of d is an estimate of direct effects. If one estimates (1c), the estimate of (d+cg) is an estimate of total effects. If A is a vector of intervening influences, cg is a linear combination of terms and either the direct effect or the total effect or both may be zero even though vocational education is relevant to the outcomes. Strong indirect effects may produce a strong total effect even though the direct effect is negligible. In contrast, total effects may appear negligible if strong direct and indirect effects tend to offset each other. In either case, policies that enhance positive indirect effects or eliminate negative ones can improve the economic value of secondary vocational education. Our objective in this paper was

to clarify the interpretation of estimates of effects by providing estimates of both d and cg.

This approach is an attempt to follow up on a suggestion made by Gustman (1982)* at a conference on youth employment problems. He called, among other things, for study of the role of vocational education in the job search process, in the determination of tenure on the job and general labor market experiences, and in development of productive skills through on-the-job training, with a special emphasis on the ". . . intermediating role of tenure, experience, unionization, and other intervening variables which may be affected by vocational training. . . ."

Economists have estimated the magnitudes of occupation and industry differentials (Reder, 1955, 1960; Rosen, 1970; Keat, 1967) and differentials between unionized and non-unionized jobs (Lewis, 1963: Rosen, 1969; Ashenfelter and Johnson, 1972). It is also known that earnings vary with general and specific human capital accumulation (Becker, 1975; Mincer, 1960, 1974). In the absence of direct measures of general and specific components of human capital, educational attainment is most often used as a proxy for general human capital acquired through formal instruction, labor market experience as a proxy for general human capital acquired on-the-job, and job tenure as a proxy for specific human capital acquired on-the-job. Hence, if secondary vocational education affects occupation, industry, unionization,

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*Strictly speaking, to the authors' interpretation of Gustman's remarks. His suggestions were deeply appreciated by the authors. But, he bears no responsibility for their errors in translating his suggestions into a finished product.

labor market experience, job tenure, or educational attainment, it will have indirect effects on the subsequent outcomes. These indirect effects are in addition to any direct effects it may have. The issue for our work is whether secondary vocational education affects the outcomes directly, indirectly, or in both ways.

This discussion can be summarized in terms of the outcomes that are examined in this paper and the intervening factors that help to explain the effect of vocational education on those outcomes. The focus here is on hourly earnings, monthly earnings, the rate of labor force participation, and the fraction of time spent unemployed. Vocational education is expected to affect those outcomes through its impact on a respondent's educational attainment, labor market experience, job tenure, occupational choice, industry of employment, and unionization of the job. Some of these intervening relationships have been examined before, but never in a unified treatment that has linked vocational education to them and then linked them to outcomes, and never before with a recently developed* classification scheme to identify different patterns of participation in vocational education.

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*This scheme is discussed further in section III. For a detailed presentation see Campbell, Orth, and Seitz (1981).

III

The data used in this study are from the National Longitudinal Survey of Labor Market Experience, the Youth Cohort (NLS Youth). Both interview and transcript data are used in the analyses. The Center for Human Resource Research (CHRR) at the Ohio State University, with support from the U.S. Departments of Labor and Defense, initiated the NLS Youth interview data collection in 1979. The National Center for Research in Vocational Education, with funding from the U.S. Department of Education, Office of Vocational and Adult Education, and under a collaborative agreement with CHRR, supplemented the NLS Youth interview data with the high school transcripts of the older members of the cohort. The merger of the two data sources provides an information base to examine the effects of secondary vocational education on labor market experiences.

The NLS Youth is a national probability sample of 12,686 persons who were between the ages of fourteen and twenty-one when originally selected for the survey in 1978. The sample was drawn by a household screening process in three stages: a cross-sectional sample; a supplemental sample of blacks, Hispanics, and economically disadvantaged whites; and not used in these analyses, a sample of youth serving in the military. Both the cross-sectional and supplemental samples were stratified by sex in order to obtain relatively equal proportions of men and women.

Weighting procedures have been developed to compensate for the oversampling of these groups.*

NLS Youth respondents were first interviewed early in 1979, with annual followups through 1982. The data collected included background information about the respondent's family, schooling, work history, and current educational and labor market activities.

The transcript collection effort was initiated in 1980 and completed in three rounds. The last round, which includes those who were fourteen at the time of the first interview, were not available for these analyses. The information gathered from the transcripts included the grade level at which a course was taken, a course code, the amount of credit received, and the letter grade received for the course. These data were then used to identify the patterns of vocational participation in high school in order to make a better examination of the effects of vocational training on the labor market experiences of youth.

Transcript data were used by Campbell, Orth, and Seitz (1981) to classify people into different patterns of participation in vocational education. This method is preferred over both self-report of high school curriculum and administrator classification because it reflects the variability within the

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*For a full description of the sampling design, weighting procedures, and a descriptive analysis of the first year's data, see Borus et al., Youth Knowledge Development Report 2.7 Findings of the National Longitudinal Survey of Young Americans, 1979 (1980).

vocational education experience. In most previous studies, all students who reported that they had followed a vocational program or who were classified as vocational by school administrators were treated as homogeneous groups. Some studies have allowed for variations in specialty area or for the difference between courses related or not related to later jobs. For this report, the amount and variation of a student's actual vocational credits, as indicated on the transcript, were used as indices of involvement in secondary vocational education.*

The patterns of participation were first developed by operationalizing five descriptive concepts that reflect different aspects of vocational course-taking: (1) the number of credits received in vocational courses in the program area of specialization; (2) the number of program areas in which vocational courses were taken; (3) the number of years in which the specialty was pursued; (4) the number of vocational credits in the program area that were determined to be supportive of the specialty area; and (5) a scaled measure of whether the specialty was pursued in the eleventh and/ or twelfth grade. A student's area of specialization was defined as the program area (e.g., distributive

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*Seven subject matter areas were identified on students' transcripts as "vocational." These categories were agriculture, marketing and distributive education, health occupations, home economics, office occupations, technical education, and trade and industrial occupations. Technical education was combined with trade and industrial courses, and the two are identified here as a single specialty area. A concerted effort was made to exclude from the vocational classifications such course areas as industrial arts, personal typing, and nonoccupational home economics.

education, home economics) in which at least six-tenths of the total number of vocational credits were received. Target profiles for each pattern were specified, and a case was assigned to the pattern type from which it had the smallest Euclidean distance. The five patterns were labeled Concentrator, Limited Concentrator, Concentrator/Explorer, Explorer, and Incidental/Personal, and were ordered by the degree of involvement in vocational education. Students who took no vocational courses at all and those with missing or incomplete transcripts make up the rest of the sample.*

Concentrators take an average of six vocational credits over a three-year period. Limited Concentrators generally take about half that number, usually within a two-year span. Concentrator/Explorers, are similar to Limited Concentrators except that the vocational course work is usually completed early in the high school years. Students classified in the Explorer pattern pursue courses in three or more program areas but do not achieve any level of specialization** In comparison, Incidental/Personal students average less than a full credit and generally complete the work in a semester.

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*For a full description of the methodology and techniques used to construct and validate the patterns of participation variable, the reader is referred to the work by Campbell, Orth, and Seitz (1981).

**Explorers are too few to permit confidence in any estimates of their differences from other patterns. But they are kept separate in these analyses to avoid contaminating the estimates for any pattern with which they might otherwise be grouped. Coeffecient estimates for them are not shown in any of the tables although their observations are included in the estimates.

In addition to these descriptions of vocational curriculum patterns, Campbell and Seitz completed some related analyses of academic or college preparatory courses. Approximately 20 percent of the NLS Youth high school graduates follow a pattern of study that could be designated academic. It includes four units of English, three units of math, two units of science, two units of social science, and sometimes two units of a foreign language. There is a modest overlap between the academic pattern and the vocational patterns. Six percent of the Concentrators also qualify as academic by these criteria, as do 12 percent of the Limited Concentrators and 9 percent of the Concentrator/Explorers. Among those with the lowest level of vocational concentration, the Incidental/Personal group, 26 percent are academic, and among those without any vocational credits 33 percent meet the criteria. Those students without any vocational credits or with only incidental/personal participation in vocational education were classified in the analyses as academic if they met these criteria; if not, they were classified as general.

These patterns were used in the analyses in place of the traditional curriculum descriptors of vocational, general, and college preparatory. Also, in order to evaluate how representative the subsample of respondents with transcripts was, persons who had completed at least twelve years of school but for whom transcript data were either missing or incomplete were included in the analyses. This group was labeled "Incomplete Transcript."

In estimating labor market outcomes, one further step was necessary in defining curriculum patterns. The three Concentrator categories were distinguished by whether the respondents were working in jobs that were related to their specialty areas, as described in the footnote on page 14. Training-relatedness is interpreted rather broadly on this criterion. The area of specialty was determined from the transcript. The relatedness of the specialty to the job was determined by reference to the NOICC (1979) occupational and educational crosswalk, which uses both the Census 3-digit occupational code and the Census 3-digit industrial code to determine training-relatedness. Thus, in the empirical work reported here, the categories Concentrator, Limited Concentrator, and Concentrator/Explorer indicate both that the respondent has taken the courses to be in one of the Concentrator categories and that the current or most recent job as of the 1982 interview is related to training. To maintain as clean a comparison as possible, those respondents who qualify in one of the Concentrator categories but were not in training-related jobs were kept separate from the general curriculum respondents and identified by their own category, "Vocational-Unrelated" in the tables that follow. The rates of training-related placement were 45%, 32% and 25% for Concentrators, Limited Concentrators, and Concentrator/Explorers, respectively.

The formal model is specified in structural form as:

$$Y = a + bX + cA + dV + n \qquad (2a)$$

$$H^*A = F^*X + G^*V + u^* \qquad (2b')$$

Equation (2b') is a system of simultaneous equations that expresses the intervening factors, A, as functions of other intervening factors, of exogenous variables other than high school curriculum, X, and indicators of curriculum, V. The important assumption here is that the elements of A influence, but are not influenced by, the outcomes of interest, Y. Because it is quite difficult to specify (2b') in a form that permits identification of all the structural parameters, we estimated the reduced-form version of (2b') that expresses each element of A as a linear function only of X, V, and u, the vector of reduced-form errors:

$$A = e + fX + gV + u \qquad (2b)$$

The coeffecients a, b, c, d, e, f, and g are vectors of appropriate dimension. Elements of Y include:

(1) Log hourly earnings on the 1982 interview job;

(2) Monthly earnings for the same job;

(3) Labor force participation rate in percentage points (1 to 100) for the respondent in calendar year 1981 [100 x (weeks worked + weeks unemployed) / 52];

(4) Unemployment rate in percentage points for the respondent in calendar year 1981 [100 x (weeks unemployed) / (weeks worked + weeks unemployed)].

Because the labor force participation and unemployment rates have restricted ranges, and because for the former many cases clustered at the upper limit and for the latter many cases clustered

at the lower limit, equations (2a) for these outcomes should be estimated using the Tobit technique (Maddala, 1977). For this preliminary draft, estimates were made by OLS.

Elements of V include binary variables that take on the value 1 if the respondent fits the curriculum category or 0 otherwise. The curriculum categories were defined above and are mutally exclusive. Recall that Concentrator categories are indicated only if the job is training-related. The "general" curriculum category is the comparison group for all equations. Estimates for elements of d and g reflect differentials between the specified curriculum category and the "general" category.

Elements of A include the intervening factors discussed above:

(1) Highest grade of formal education completed by the 1982 interview;

(2) Labor market experience since age 16, in months;

(3) Tenure on the 1982 interview job, in months;

(4) A variable that equals 1 if wages on the 1982 interview job are set through formal collective bargaining, 0 otherwise. This element of A should be estimated in (2b) using a probit functional form. Considerations of cost led us to use linear probability models instead for this equation and for(3c) and (3d) as discussed below.

Labor market experience includes employment during 1981, for hourly and monthly earnings equations. It excludes 1981 in

Tobits for the outcomes labor force participation and unemployment rate. Also, tenure is omitted as an intervening factor (explanatory variable) for those latter two outcomes because, by definition, it is related to them.

The industry and occupation in which people work is of interest because much of the character of a job is determined once those dimensions are specified. In addition to equations (2a) and 2b) above, we estimated a set of equations:

$$P(O_i = 1) = 1 / [1 + \exp(-e^* - f^*X - g^*V - n')] \quad (3c)$$

(i = Professional, ..., Service)

$$P(I_j = 1) = 1 / [1 + \exp(-e^{**} - f^{**}X - g^{**}V - u^{**})] \quad (3d)$$

(j = Agriculture, ..., Public Administration)

where O and I are vectors of binary variables indicating occupational and industrial categories, respectively, and i and j index occupations and industries. Note that the probabilities of being in an occupational or industrial category should be estimated with a probit or logit functional form to impose the range restriction (0, 1) of the dependent variable on the estimates. Considerations of cost with the large number of equations to be estimated (about 80) led us to use OLS methods instead.

Elements of X were entered in (2a), (2b), (3c), and (3d) to control for contextual or background influences on the individual that might be expected to influence the outcomes and whose omission might bias estimates of d and g because they might be related to curriculum selection. These influences include:

(1) Socioeconomic status of respondent's family when respondent was 14;*

(2) Region of the country, indicated by binary variables for Northeast, South and West, with North Central being the comparison group;

(3) A binary variable indicating whether respondent resided in a county with more than 50% of its population living in rural communities;

(4) AFQT scores on tests administered to the respondents as a special aspect of the NLS survey, used as an indicator of academic achievement and motivation.

Including these variables and stratifying the sample by gender and race/ethnicity represents the best attempt we could make to control our estimates of curriculum effects for the influences of the local labor market, family background, intelligence, motivation, traditional gender-based differences in labor market experiences, and racial/ethnic differences that may be attributable to some combination discrimination and differences in background not captured by the other variables.

Separate equations were run for each of four combinations of gender and racial/ethnic characteristics: white males, white females, minority (black or Hispanic) males, and minority females.

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*See Campbell, Gardner, and Seitz (1982) for a more detailed description of the creation of this scale.

The sample was restricted to include only those respondents who were high school graduates, were not students at the time they reported holding the jobs, who had held at least one job within the year preceding the May 1982 interview, and reported working thirty or more hours per week on the 1982 interview job. (This restriction on hours reflects the fairly common practice in personnel policies of considering thirty hours or more full time for the purpose of determining benefits).

The vectors n and u are random error terms that capture all of the effects on Y or A that are not observable in the model. The estimation techniques assume that the proper controls have been included to reflect all the systematic influences on Y or A. That is, each element of n and u is assumed to be normally distributed and uncorrelated with any of the explanatory variables in its equation. This assumption also allows us to sidestep the question of whether curriculum choice should be regarded as endogenous to this model. The issue of endogeneity arises because estimates of (2a) will be biased if unobservable elements affect both the outcome variables and curriculum choice. That issue is important and is the subject of work in process by the author and colleagues. But, without a clear resolution of that issue, we have elected to sidestep it here.

IV

General tendencies. Our estimates conform broadly to the conventional wisdom regarding each of the four standard dimensions of variations in labor market outcomes. First, in the human capital dimension, higher levels of educational attainment are associated with higher earnings for all groups and less early labor force participation for all groups except minority females. (Interestingly, the rate of return to an additional year of education is estimated to be greater for females and minority males than for white males.) Labor market experience and tenure tend to be positively associated with higher earnings, greater recent labor force participation, and less recent unemployment.* These associations are stronger for males than for females. Women who have children and perceive that the children restrict their work opportunities are likely to be in lower-paying, less-prestigious jobs and to have less recent labor market experience.

Second, wages are set through collective bargaining more often in jobs with above average than below average earnings. The differential is substantial, over 25% for males and about half of that for females. Note that the estimates are not of the pure union/nonunion differential, because industry and occupation

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*Recall that experience and tenure as explanatory variables do not include 1981 when labor force participation and unemployment in 1981 are the dependent variables.

were not controlled in these equations. The estimates are a combination of the union/nonunion earnings differential and of the tendency for unions to be formed in relatively high wage occupations and industries.

Third, occupational and industrial patterns for men are generally as expected, with Concentrators and Limited Concentrators in training related employment being much more likely to work in craft occupations and durable manufacturing industries and much less likely to work in service occupations and in wholesale or retail trade. Graduates of an academic curriculum are far more likely to work in professional occupations. Among women, Concentrators and Limited Concentrators in training related employment are much more likely to be working in service occupations.

White males. Among white males (Table 1), Concentrators and Limited Concentrators are estimated to earn substantially more per hour and per month than do otherwise similar general curriculum students who had no secondary vocational education. The estimated direct effect differentials of over 10% amount to more than $.55 per hour and more than $120 per month and are significantly positive in both the statistical and the practical senses.

These estimated direct effects for white male Concentraors are attributable in large part to differentials for specialists in technical or trade and industrial areas. Estimates (not shown) for specialists in those areas show even higher differentials than are presented in Table 1. Most male vocational

TABLE 1
DIRECT AND INDIRECT OUTCOME DIFFERENTIALS
THROUGH HUMAN CAPITAL VARIABLES
White Male

	Estimated Percentage Direct Effects				Impact on Intervening Factors (g)		
Patterns (compared to general curriculum)(d):	Hourly Earnings $ (Mean = $5.80)	Monthly Earnings $ (Mean = $1066)	Labor Force Participation $ (range 0 to 100)	Unemployment Rate $ (range 0 to 100)	Education (Years)	Labor Market Experience (Mos.)	Tenure (Mos.)
Concentrator	11.0** (2.00)	16.6***(2.80)	3.8 (0.66)	.3 (0.14)	-.47***(2.87)	-.8 (0.31)	-.2 (0.38)
Limited Concentrator	12.9** (2.25)	12.9** (2.09)	5.8 (0.95)	-5.9** (2.24)	-.20 (1.71)	3.6 (1.38)	.9 (1.36)
Concentrator/Explorer	.7 (0.08)	3.4 (0.34)	1.7 (0.18)	-.7 (0.17)	-.29 (1.03)	2.3 (0.93)	-0.0 (0.01)
Voc Unrelated	-.3 (0.09)	-1.1 (0.28)	6.8* (1.75)	-1.3 (0.81)	-.01 (0.11)	-.1 (0.04)	.6 (1.47)
Academic	3.5 (0.77)	3.0 (0.60)	0.0 (0.00)	.9 (0.45)	.77***(5.65)	-4.4** (2.15)	-.3 (0.62)
Incomplete Transcript	-1.9 (0.60)	1.3 (0.37)	.9 (0.28)	-1.4 (0.10)	-.07 (0.77)	-.6 (0.44)	.1 (0.28)
Human Capital Variables(c):							
Education (Years)	3.5***(3.40)	3.5***(3.15)	-2.8***(2.76)	-.2 (0.33)			
Labor Market Experience (Mos.)	.9***(3.20)	.9***(3.06)	2.0***(7.86)	-.5***(4.79)			
Experience^2/100	-.6* (1.92)	-.5 (1.52)	-1.8***(4.84)	.4***(2.86)			
Tenure (Mos.)	2.4* (1.79)	2.5* (1.76)					
Tenure^2/100	-3.1 (0.34)	-4.4 (0.45)					
Union (c)	25.8***(8.43)	20.6***(6.25)	6.7** (2.04)	1.3 (1.04)			
(n)	(1029)	(1029)	(1011)	(1011)	(1039)	(1039)	(1039)
Adj. R^2	.2	.17			.27	.02	.01
SE			31.6	38.5			

* P <= .10 ** P <= .05 *** P <= .01

Note: All analyses except labor force participation and unemployment by OLS and include controls for SES, AFQT, Northeast, South, West, Rural. Labor force participation and unemployment were estimated using a Tobit approach. Numbers in parentheses are t-ratios unless otherwise indicated.

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TABLE 2

DIFFERENTIALS IN PROBABILITY (x100) of
WORKING IN OCCUPATIONS, INDUSTRIES, OR UNIONIZED JOBS
COMPARISON GROUP: GENERAL CURRICULUM
White Males (n=1286)

Patterns:	Concentrator	Limited Concentrator	Concentrator/ Explorer	Vocational/ Unrelated	Academic	Incomplete Transcript
Unionization	-.8 (0.14)	8.0 (1.33)	22.9** (2.34)	-6.3* (1.64)	-6.5 (1.39)	1.0 (0.30)
Occupation(c*):						
Professional	-.6 (0.16)	-6.8* (1.71)	-7.6 (1.15)	-1.8 (0.69)	10.5***(3.34)	-1.2 (0.52)
Manager	-6.1 (1.66)	.8 (0.22)	-7.4 (1.18)	1.8 (0.73)	1.0 (0.32)	.1 (0.07)
Sales	-4.3 (1.35)	-1.4 (0.42)	5.8 (1.05)	-0.0 (0.01)	-3.4 (1.31)	1.4 (0.75)
Clerical	-9.6** (2.34)	-4.2 (0.99)	.8 (0.11)	-.4 (0.16)	5.1 (1.53)	-4.2* (1.73)
Craft	33.8***(5.97)	25.4***(4.29)	15.7 (1.62)	3.8 (0.98)	-8.5* (1.84)	3.3 (1.00)
Operative	-5.9 (0.99)	-5.2 (0.84)	5.4 (0.53)	-5.2 (1.27)	-1.6 (0.32)	-4.6 (1.30)
Nonfarm Labor	-6.6 (1.48)	-5.6 (1.21)	-6.5 (0.85)	3.2 (1.06)	-2.8 (0.77)	.4 (0.16)
Farmer	1.8* (1.69)	.2 (0.15)	.5 (0.26)	.6 (0.81)	.1 (0.11)	1.4** (2.23)
Farm Labor	5.3***(2.81)	.3 (0.15)	-1.0 (0.32)	-.2 (0.13)	-.2 (0.14)	1.6 (1.41)
Service	-7.7** (1.82)	-3.4 (0.76)	-5.5 (0.76)	-1.8 (0.64)	-.1 (0.04)	1.7 (0.66)
Industry (c**):						
Agriculture	5.0* (1.71)	-3.4 (1.13)	-4.1 (0.82)	-1.6 (0.80)	-3.0 (1.27)	1.7 (1.01)
Mining	2.4 (1.04)	-.4 (0.17)	-3.8 (0.96)	-.9 (0.56)	1.0 (0.49)	-1.5 (1.05)
Construction	6.8 (1.53)	8.5* (1.81)	14.9** (1.95)	-3.3 (1.08)	-6.0* (1.64)	-1.8 (0.70)
Nondurable Mfg.	-1.4 (0.33)	-4.4 (1.02)	-4.0 (0.56)	-.3 (0.11)	3.7 (1.09)	0.0 (0.01)
Durable Mfg.	13.4***(2.47)	7.6 (1.34)	4.3 (0.46)	-2.4 (0.65)	-5.3 (1.19)	-3.1 (0.98)
Transportation	-2.8 (0.91)	-.4 (0.12)	.9 (0.18)	-.6 (0.31)	-2.3 (0.95)	2.1 (1.18)
Trade	-18.7***(3.03)	-1.1 (0.16)	-4.4 (0.42)	6.6 (1.39)	3.2 (0.62)	-.6 (0.16)
Finance	-3.2 (1.37)	-1.5 (0.62)	2.0 (0.49)	.2 (0.10)	-2.0 (1.02)	-1.7 (1.23)
Personal Service	-2.9 (1.34)	-3.3* (1.67)	2.0 (0.62)	-2.0 (1.56)	-2.5 (1.60)	-1.8* (1.64)
Business/Repair Service	7.5** (2.04)	1.4 (0.37)	.6 (0.10)	3.9 (1.55)	7.6***(2.49)	4.0* (1.84)
Entertainment Service	-1.5 (0.81)	-1.2 (0.63)	-1.4 (0.44)	.4 (0.29)	1.7 (1.13)	.1 (0.07)
Professional Service	-4.1 (1.22)	.5 (0.13)	-5.4 (0.94)	-.3 (0.15)	1.7 (0.62)	1.4 (0.68)
Public Administration	-.6 (0.25)	-2.2 (0.95)	-1.6 (0.43)	.4 (0.24)	2.6 (1.42)	1.2 (0.94)

* P <= .10 ** P <= .05 *** P <= .01

Note: All estimates are OLS, with controls for SES, AFQT, Northeast, South, West, Rural
Numbers in parenthesses are t-ratios unless otherwise indicated.

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students specialize in either the trade/industry/technical or business/office areas, and these two predominant specialties account for approximately equal percentages of vocationally educated males.

Our estimates suggest weak and imprecisely measured indirect effects for white males through some human capital variables. For Limited Concentrators and Concentrator/Explorers for labor market experience there are positive differentials between vocational students and either general students or vocational students in employment unrelated to their training. The difference in earnings attributable to differences in labor market experience is about $.15 per hour and $30 per month for Limited Concentrators, about 2/3 of that for Concentrator/Explorers. In the opposite direction, the lower level of educational attainment for Concentrators reduces the total earnings differential for them by about 1.5%, or about $.10 per hour or $15 per month.

These estimates suggest (see summary in Table 9) an advantage of approximately $1.00 per hour and $190 per month for Limited Concentrators compared to general curriculum and vocational (unrelated) graduates. Concentrators have advantages that are from 1/2 to 2/3 as large. The differences between Concentrators and Limited Concentrators are mostly attributable to differences in indirect effects.

Concentrators and Limited Concentrators in training-related placement are significantly more likely to be in either craft occupations or durable goods manufacturing industries and less likely to be in service occupations or in trade industries (Table

2). This finding is also consistent with the large proportion of white male vocational students who specialize in technical or trade and industry areas. A puzzling finding is that Concentrators also are more likely to be in farm laborer occupations. Finally, Concentrator/Explorers are the only vocational students to be more likely to be in sales positions, and this reflects the dominance of Concentrator/Explorers in the marketing (distributive education) specialty.

For most vocational students (whether or not in training-related jobs) there is no difference with general students in the likelihood of being in unionized jobs. Thus, for most students this is not a source of indirect effects on outcomes. For Limited Concentrators and Concentrator/Explorers, however, there are estimated to be higher likelihoods of being in a unionized job, and that contributes an indirect effect that tends to increase the total differential for them in comparison to general students. For Concentrator/Explorers, the unionization patterns alone give rise to about a 5% earnings differential.

Overall, these estimates suggest that there are strong direct effects on earnings and labor force participation for Concentrators and Limited Concentrators and positive but somewhat weaker effects for students with less concentration in secondary vocational education. Differences attributable to indirect effects are isolated, but those that we find are generally consistent with expected patterns of educational attainment among vocational graduates. These findings generally agree with the studies that find positive earnings effects for male vocational

graduates, and we agree with those that find stronger effects for specialists in the trade and industry area. The estimates of stronger effects for Concentrators and Limited Concentrators than for Concentrator/Explorers suggests that previous studies that have treated all vocational students (or at least all those specializing in the trade and industry area) as a homogeneous group have underestimated the earnings advantages for those students with the most intensive involvement in secondary vocational education.

Minority males. Estimated earnings differentials for minority male Concentrators are as large as or larger in percentage terms than those estimated for white males, but are not as precise (especially for monthly earnings). Also, the pattern is slightly different in that for minority males Concentrator/Explorers and Concentrators have larger earnings differentials than do Limited Concentrators (Table 3). The large differentials amount to more than $.75 per hour and $120 per month. Unemployment rates over the previous year are lower for Concentrators and Limited Concentrators, but significantly so only for Concentrators.

Indirect effects are felt through education, labor market experience, and tenure. The direction of impact is similar for all three concentrator patterns, although the magnitudes and the precision of estimates varies. Educational attainment is reduced by about 1/4 of a year, reducing hourly or monthly earnings (on average) by about 2% ($.10 per hour and $18 per month). Labor

TABLE 3
DIRECT AND INDIRECT OUTCOME DIFFERENTIALS
THROUGH HUMAN CAPITAL VARIABLES
Minority Male

	Estimated Percentage Direct Effects				Impact on Intervening Factors (q)		
Patterns (compared to general curriculum)(d):	Hourly Earnings $ (Mean = $5.35)	Monthly Earnings $ (Mean = $953)	Labor Force Participation $ (range 0 to 100)	Unemployment Rate $ (range 0 to 100)	Education (Years)	Labor Market Experience (Mos.)	Tenure (Mos.)
Concentrator	15.7** (1.95)	13.7 (1.56)	-.1 (0.00)	-8.7* (1.76)	-.21 (0.97)	7.7* (1.94)	2.2** (2.28)
Limited Concentrator	5.6 (0.64)	2.8 (0.29)	9.8 (0.91)	-1.9 (0.38)	-.16 (0.66)	3.9 (0.91)	1.0 (1.00)
Concentrator/Explorer	18.5* (1.82)	9.6 (0.87)	-21.3** (1.98)	1.2 (0.22)	-.36 (1.31)	11.8** (2.34)	1.4 (1.12)
Voc Unrelated	.8 (0.17)	-.8 (0.16)	-6.6 (1.28)	-1.2 (0.45)	-.11 (0.90)	4.7** (2.06)	.7 (1.25)
Academic	-4.3 (0.62)	-6.6 (0.87)	-13.1* (1.73)	-.8 (0.19)	.47***(2.56)	2.3 (0.70)	.9 (1.67)
Incomplete Transcript	6.7* (1.80)	4.8 (1.18)	-1.6 (0.39)	1.3 (0.64)	-.02 (0.19)	1.2 (0.65)	-.4 (1.00)
Human Capital Variables (c):							
Education (Years)	7.9***(5.01)	7.0***(4.11)	-1.5 (0.88)	-2.2** (2.34)			
Labor Market Experience (Mos.)	1.4***(4.59)	1.5***(4.61)	2.3***(7.00)	-.6***(3.51)			
Experience^2/100	-1.0***(2.62)	-1.0***(2.58)	-1.9***(3.33)	.3 (0.84)			
Tenure (Mos.)	1.7 (1.06)	1.4 (0.83)					
Tenure^2/100	-6.1 (0.57)	-3.8 (0.33)					
Union (c)	24.4***(7.30)	24.5***(6.72)	3.5 (0.92)	.3 (0.19)			
(n)	(556)	(556)	(543)	(543)	(574)	(574)	(574)
Adj. R^2	.29	.27			.20	.02	.02
SE			31.6	40.0			

* P <= .10 ** P <= .05 *** P <= .01

Note: All analyses except labor force participation and unemployment by OLS and include controls for SES, AFQT, Northeast, South, West, Rural. Labor force participation and unemployment were estimated using a Tobit approach. Numbers in parentheses are t-ratios unless otherwise indicated.

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TABLE 4

DIFFERENTIALS IN PROBABILITY (x100) of
WORKING IN OCCUPATIONS, INDUSTRIES, OR UNIONIZED JOBS
COMPARISON GROUP: GENERAL CURRICULUM
Minority Males (n=662)

Patterns:	Concentrator	Limited Concentrator	Concentrator/ Explorer	Vocational/ Unrelated	Academic	Incomplete Transcript
Unionization	1.9 (0.18)	-7.3 (0.65)	12.6 (0.96)	-5.0 (0.45)	-2.3 (0.25)	-2.2 (0.45)
Occupation(c*):						
Professional	4.2 (0.81)	-1.1 (0.19)	-.7 (0.11)	5.8** (1.91)	23.7***(5.22)	3.8 (1.55)
Manager	-4.4 (0.96)	-4.6 (0.93)	-4.3 (0.75)	.5 (0.17)	-.8 (0.21)	-2.0 (0.96)
Sales	-3.8 (0.96)	-5.2 (0.75)	11.5** (2.31)	-2.3 (0.99)	1.7 (0.48)	-1.2 (0.68)
Clerical	-1.3 (0.17)	6.2 (0.75)	-11.7 (1.22)	7.8* (1.77)	-7.5 (1.12)	.2 (0.06)
Craft	29.1***(3.66)	14.9* (1.73)	11.6 (1.15)	-.7 (0.15)	5.9 (0.85)	.9 (0.24)
Operative	5.6 (0.55)	23.3** (2.14)	2.6 (0.21)	-1.7 (0.29)	-15.9* (1.81)	2.6 (0.54)
Nonfarm Labor	-12.6 (1.31)	-20.9** (2.32)	-19.2* (1.83)	4.0 (0.82)	-7.2 (0.99)	-6.0 (1.53)
Farm Labor	-2.2 (0.67)	3.0 (0.83)	4.7 (1.11)	1.1 (0.59)	.2 (0.07)	-.2 (0.12)
Service	-14.8* (1.85)	-17.9** (2.06)	5.4 (0.54)	-14.7***(3.15)	-.1 (0.02)	1.3 (0.36)
Industry (c**):						
Agriculture	-4.3 (0.90)	.7 (0.14)	3.1 (0.51)	6.1** (2.20)	-1.9 (0.44)	-.7 (0.33)
Mining	-3.2 (0.92)	2.4 (0.63)	12.7***(2.93)	-2.3 (1.23)	.1 (0.05)	-1.2 (0.73)
Construction	1.6 (0.26)	3.5 (0.52)	9.9 (1.27)	-3.3 (0.94)	-3.7 (0.69)	3.9 (1.34)
Nondurable Mfg.	4.5 (0.62)	7.5 (0.96)	-3.4 (0.37)	-2.0 (0.49)	2.3 (0.37)	3.9 (1.16)
Durable Mfg.	34.0***(4.33)	20.8***(2.44)	2.5 (0.26)	1.4 (0.30)	9.3 (1.35)	-2.3 (0.62)
Transportation	-5.3 (0.93)	.1 (0.02)	-4.5 (0.62)	2.5 (0.75)	-6.7 (1.32)	3.8 (1.41)
Trade	-25.5***(2.64)	-9.0 (0.86)	14.3 (1.16)	4.6 (0.82)	2.1 (0.24)	-6.4 (1.42)
Finance	-5.0 (0.98)	-4.5 (0.82)	-7.3 (1.13)	2.6 (0.87)	-4.4 (0.97)	-.8 (0.33)
Personal Service	.6 (0.14)	-3.3 (0.72)	-3.3 (0.62)	-3.2 (1.28)	-3.7 (0.99)	3.1 (1.53)
Business/Repair Service	-5.0 (0.79)	-9.5 (1.40)	-9.7 (1.23)	-1.3 (0.28)	-6.7 (1.22)	-1.4 (0.48)
Entertainment Service	-1.3 (0.66)	-1.0 (0.50)	-.8 (0.32)	-.9 (0.75)	2.7 (1.56)	-3.0 (0.01)
Professional Service	2.6 (0.45)	-5.7 (0.91)	-5.0 (0.68)	-1.8 (0.53)	13.1***(2.57)	1.8 (0.65)
Public Administration	5.9 (1.21)	-2.1 (0.39)	-8.5 (1.38)	-2.9 (1.02)	-2.7 (0.64)	-4.3* (1.87)

* P <= .10 ** P <= .05 *** P <= .01

Note: All estimates are OLS, with controls for SES, AFQT, Northeast, South, West, Rural
Numbers in parentheses are t-ratios unless otherwise indicated.

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market experience is increased from 4 to 12 months and tenure by 1 to 2 months. The estimates of the non-linear impact of experience and tenure suggest that additional experience continues to raise earnings up to about 4 years (the limit of the range on which the estimates are based) and additional tenure raises earnings up to about 12 months. This latter finding is consistent with the idea that youth make their largest earnings gains through changing jobs, but that at least some advantage attaches to staying beyond the stage of being a brand new hire. The total differential for minority male Concentrators and Concentrator/Explorers is more than $1.00 per hour and perhaps as much as $190 per month (Table 9).

Working in a unionized job confers large earnings advantages. Although there is no clear tendency for the vocationally educated to be more or less likely to work in unionized jobs, Concentrators and Concentrator/Explorers are estimated to be more likely and Limited Concentrators to be less likely than either general curriculum or vocational (unrelated) graduates to work in unionized jobs.

The occupational and industrial patterns (Table 4) are similar to those for white males. Concentrators and Limited Concentrators are more likely to work in craft ocupations or in durable goods manufacturing and are less likely to work in service occupations. Concentrator/Explorers are more likely to work in sales occupations or (imprecisely measured) in the construction mining, or trade industries.

White females. For white females the pattern of hourly earnings differentials is similar to that for white males (Table 5). Concentrators have a positive (but not precisely measured) differential that is smaller than the statistically significant estimate for Limited Concentrators. The differentials are much smaller in both percentage and absolute terms than for white males, (about $.20 for Concentrators, $.47 for Limited Concentrators), but still of practical significance. The estimated differentials for monthly earnings are less than half those for white males, but still positive for all three concentrator groups and large enough for Concentrators and Limited Concentrators between $25 and $60 per month) to be of practical significance if they could be measured more precisely. Also unemployment rates are lower for all three concentrator groups, although the estimates are precise only for Concentrator/Explorers.

The estimated indirect effects through human capital variables are similar to those for white males, though the percentage differentials related to education are larger and those related to labor market experience are smaller. Lower average educational attainment reduces the total earnings advantage (by about $.15 per hour or $25 per month). Labor market experience offsets the educational earnings disadvantage for Concentrators and Concentrator/Explorers, and the net effect of tenure differentials is negligible. The slight tendency to be less likely to be in a unionized job reduces earnings differentials, for Limited Concentrators and Concentrator/Explorers, but by only about 1/4 as much

TABLE 5
DIRECT AND INDIRECT OUTCOME DIFFERENTIALS
THROUGH HUMAN CAPITAL VARIABLES
White Female

	Estimated Percentage Direct Effects				Impact on Intervening Factors (g)		
Patterns (compared to general curriculum)(d):	Hourly Earnings $ (Mean = $4.76)	Monthly Earnings $ (Mean = $810)	Labor Force Participation $ (range 0 to 100)	Unemployment Rate $ (range 0 to 100)	Education (Years)	Labor Market Experience (Mos.)	Tenure (Mos.)
Concentrator	3.8 (0.76)	3.4 (0.67)	5.8 (0.93)	-1.6 (0.81)	-.78***(4.36)	3.1 (1.22)	.2 (0.70)
Limited Concentrator	9.9* (1.90)	7.4 (1.37)	-1.6 (0.25)	-1.2 (0.60)	-.62***(3.32)	-1.5 (0.59)	-.3 (0.50)
Concentrator/Explorer	-3.0 (0.38)	2.2 (0.27)	20.9* (1.67)	-7.6* (1.83)	-.32* (1.77)	6.0 (1.47)	.1 (0.09)
Voc Unrelated	-5.4* (1.86)	-5.5* (1.89)	2.7 (0.76)	-2.4** (2.16)	-.21** (2.02)	1.6 (1.13)	.4 (1.06)
Academic	-2.9 (0.67)	-2.7 (0.61)	-6.0 (1.13)	-.7 (0.39)	.87***(5.73)	-.3 (0.13)	-.6 (1.20)
Incomplete Transcript	-1.5 (0.51)	-1.7 (0.59)	1.8 (0.30)	-.7 (0.65)	-.24** (2.30)	-.3 (0.23)	.2 (0.49)
Human Capital Variables (c):							
Education (Years)	3.9***(4.69)	4.1***(4.82)	-3.2***(3.14)	.1 (0.31)			
Labor Market Experience (Mos.)	.6***(2.87)	.8***(3.31)	1.4***(5.43)	-.4***(4.96)			
Experience^2/100	-.3 (1.21)	-.4* (1.63)	-.9** (2.36)	.3** (1.98)			
Tenure (Mos.)	.9 (0.79)	1.2 (1.02)					
Tenure^2/100	3.5 (0.47)	1.7 (0.22)					
Union (c)	10.2***(3.77)	10.6***(3.82)	4.6 (1.35)	-1.5 (1.41)			
(n)	(1089)	(1089)	(1073)	(1073)	(1132)	(1132)	(1132)
Adj. R^2	.19	.2			.36	.07	.02
SE			35.3	36.8			

* P <= .10 ** P <= .05 *** P <= .01

Note: All analyses except labor force participation and unemployment by OLS and include controls for SES, AFQT, Northeast, South, West, Rural, Child, Child restricts work opportunities, Married living with spouse, Married not living with spouse. Labor force participation and unemployment were estimated using a Tobit approach. Numbers in parentheses are t-ratios unless otherwise indicated.

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TABLE 6

DIFFERENTIALS IN PROBABILITY (x100) of
WORKING IN OCCUPATIONS, INDUSTRIES, OR UNIONIZED JOBS
COMPARISON GROUP: GENERAL CURRICULUM
White Females (n=1262)

Patterns:	Concentrator	Limited Concentrator	Concentrator/ Explorer	Vocational/ Unrelated	Academic	Incomplete Transcript
Unionization	4.1 (0.74)	-6.7 (1.14)	-5.1 (0.53)	-1.0 (0.31)	4.1 (0.85)	4.1 (1.24)
Occupation(c*):						
Professional						
Manager	-14.7***(3.19)	-6.4 (1.34)	-13.6* (1.82)	-2.4 (0.92)	15.3***(3.94)	-4.1 (1.55)
Sales	-1.7 (0.49)	-1.5 (0.42)	-6.9 (1.21)	-1.4 (0.70)	-1.5 (0.50)	-2.1 (1.02)
Clerical	1.6 (0.50)	-.4 (0.13)	6.4 (1.26)	.7 (0.41)	-.1 (0.04)	1.3 (0.69)
Craft	42.8***(6.13)	28.3***(3.92)	39.3***(3.47)	-3.2 (0.80)	-9.2 (1.58)	1.1 (0.27)
Operative	-2.2 (1.19)	-1.3 (0.76)	3.4 (1.11)	.6 (0.58)	-2.0 (1.28)	-.3 (0.27)
Nonfarm Labor	-11.9***(2.78)	-10.9***(2.45)	-14.6** (2.10)	0.0 (0.00)	-5.3 (1.46)	-1.0 (0.39)
Farm Labor	2.6 (1.44)	1.2 (0.64)	-.8 (0.27)	.4 (0.36)	.9* (0.58)	1.9* (1.76)
Service	-.1 (0.08)	.1 (0.14)	-0.0 (0.00)	.9 (1.58)	1.0 (1.26)	.2 (0.40)
Pvt Service	-15.0***(2.68)	-7.8 (1.35)	-12.3 (1.36)	4.4 (1.40)	.8 (0.17)	2.3 (0.72)
	-1.1 (0.71)	-.9 (0.56)	-.8 (0.30)	.2 (0.22)	.4 (0.29)	1.0 (1.08)
Industry (c**):						
Agriculture						
Nondurable Mfg.	-.8 (0.59)	1.1 (0.84)	-1.0 (0.47)	0.0 (0.03)	.4 (0.37)	-.4 (0.58)
Durable Mfg.	-1.6 (0.38)	-6.5 (1.48)	5.5 (0.80)	.4 (0.15)	-2.7 (0.75)	2.0 (0.81)
Transportation	-2.7 (0.72)	-3.9 (1.02)	-3.9 (0.64)	-1.5 (0.70)	-3.4 (1.08)	-1.0 (0.46)
Trade	-.1 (1.40)	.8 (0.27)	7.1 (1.50)	.8 (0.46)	-.9 (0.38)	.8 (0.47)
Finance	-9.1 (1.61)	-21.5***(3.32)	-14.7 (1.45)	-5.9** (1.64)	-6.0 (1.13)	-6.4* (1.77)
Personal Service	1.1 (0.23)	13.5***(2.74)	4.2 (0.55)	2.0 (0.74)	-3.2 (1.29)	.1 (0.13)
Business/Repair Service	-4.7 (1.55)	1.0 (0.30)	-4.1 (0.82)	.9 (0.50)	-.9 (0.36)	.6 (0.54)
Entertainment Service	6.9** (2.30)	3.7 (1.20)	12.2***(2.52)	-1.0 (0.58)	3.7 (1.46)	-1.0 (0.59)
Professional Service	-1.2 (0.80)	.2 (0.15)	-1.4 (0.63)	-.2 (0.18)	-.7 (0.50)	-.8 (0.93)
Public Administration	3.1 (0.82)	1.1 (0.17)	-.3 (0.03)	.8 (0.23)	13.3***(2.58)	1.4 (0.39)
	3.9 (1.30)	15.6***(4.07)	-1.4 (0.29)	2.9* (1.69)	3.3 (1.32)	4.7***(2.71)

* P <= .10 ** p <= .05 *** p <= .01

Note: All estimates are OLS, with controls for SES, AFQT, Northeast, South, West, Rural
Numbers in parentheses are t-ratios unless otherwise indicated.

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as the effect of reduced educational attainment. Total earnings differentials are thus slightly less than the estimates for direct differentials (Table 9).

For female vocational graduates, finding training-related employment has very strong impacts on the likely occupations and industries in which they will work (Table 6). Although the tendencies vary among the three concentrator patterns, the broad effects can be summarized as making it much more likely that one will work at a clerical occupation or in the finance, business and repair services, or public administration industries. One is less likely to work in professional/technical, operative, or service occupations or in manufacturing, personal services, or trade industries.

Minority females. For minority females all three concentrator groups are estimated to have earnings advantages vis-a-vis general curriculum graduates (Table 7). But the data exhibit too much variance to be sure that those estimates are individually different from zero. Nevertheless, the striking pattern of differentials suggests that they are consistent with the findings of statistically significant differences for other race/gender subgroups. Unlike other subgroups, however, minority female vocational students in jobs not related to their training also earn more than general curriculum graduates, but less than those in related jobs. The estimates for direct effects for those in related jobs amount to about $.30 per hour and $50 per month. The impact on labor force participation and unemployment is substantial only for Limited Concentrators.

TABLE 7
DIRECT AND INDIRECT OUTCOME DIFFERENTIALS
THROUGH HUMAN CAPITAL VARIABLES
Minority Female

	Estimated Percentage Direct Effects				Impact on Intervening Factors (g)		
Patterns (compared to general curriculum)(d):	Hourly Earnings $ (Mean = $4.39)	Monthly Earnings $ (Mean = $742)	Labor Force Participation % (range 0 to 100)	Unemployment Rate % (range 0 to 100)	Education (Years)	Labor Market Experience (Mos.)	Tenure (Mos.)
Concentrator	8.2 (0.97)	9.8 (0.62)	-6.8 (0.69)	2.3 (0.51)	-.57** (2.40)	3.1 (0.74)	.2 (0.17)
Limited Concentrator	1.4 (0.20)	6.5 (0.86)	18.4** (2.11)	-7.1* (1.83)	.07 (0.36)	4.3 (1.27)	1.9** (2.25)
Concentrator/Explorer	9.6 (0.96)	10.1 (0.91)	4.9 (0.40)	-6.5 (1.11)	.48 (1.56)	7.3 (1.42)	.4 (0.29)
Voc Unrelated	4.6 (1.10)	4.2 (0.91)	6.7 (1.37)	-1.9 (0.72)	.03 (0.43)	1.9 (0.89)	1.2** (2.39)
Academic	-11.5 (1.55)	-8.3 (1.01)	-6.3 (0.82)	2.1 (0.59)	.36* (1.76)	-1.9 (0.52)	2.3***(2.62)
Incomplete Transcript	3.9 (0.92)	4.9 (1.06)	-.6 (0.13)	2.8 (1.47)	.00 (0.03)	-1.5 (0.78)	.1 (0.21)
Human Capital Variables (c):							
Education (Years)	5.4***(3.83)	4.8***(3.04)	-1.2 (0.69)	.2 (0.20)			
Labor Market Experience (Mos.)	.2 (0.70)	.6** (1.95)	2.4***(7.68)	-.9***(6.51)			
Experience^2/100	.2 (0.69)	-.2 (0.40)	-2.0***(3.89)	.9***(3.81)			
Tenure (Mos.)	2.2***(2.98)	2.3***(2.84)					
Tenure^2/100	-3.4 (1.02)	-5.0 (1.35)					
Union (e)	13.7***(4.02)	11.9***(3.16)	-3.0 (0.78)	2.5 (1.5)			
(n)	(590)	(590)	(572)	(572)	(614)	(614)	(614)
Adj. R^2	.23	.21			.22	.05	.04
SE			33.0	38.7			

* p <= .10 ** p <= .05 *** p <= .01

Note: All analyses except labor force participation and unemployment by OLS and include controls for SES, AFQT, Northeast, South, West, Rural, Child, Child restricts work opportunities, Married living with spouse, Married not living with spouse. Labor force participation and unemployment were estimated using a Tobit approach. Numbers in parentheses are t-ratios unless otherwise indicated.

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TABLE 8

DIFFERENTIALS IN PROBABILITY (x100) of
WORKING IN OCCUPATIONS, INDUSTRIES, OR UNIONIZED JOBS
COMPARISON GROUP: GENERAL CURRICULUM
Minority Females (n=720)

Patterns:	Concentrator	Limited Concentrator	Concentrator/ Explorer	Vocational/ Unrelated	Academic	Incomplete Transcript
Unionization	-7.9 (0.76)	-1.3 (0.16)	1.0 (0.09)	1.7 (0.34)	-4.4 (0.49)	4.9 (1.03)
Occupation(c*):						
Professional	-11.1* (1.74)	-3.2 (0.61)	-3.1 (0.39)	3.2 (0.99)	-2.7 (0.48)	2.0 (0.66)
Manager	1.2 (0.27)	2.5 (0.73)	-3.7 (0.71)	-1.5 (0.71)	3.2 (0.87)	-.8 (0.42)
Sales	-.4 (0.10)	-2.6 (0.68)	3.4 (0.59)	-4.1* (1.76)	-1.0 (0.24)	-.8 (0.39)
Clerical	42.4***(3.72)	21.7** (2.31)	17.6 (1.24)	-4.5 (0.77)	7.7 (0.77)	4.2 (0.80)
Craft	-2.4 (0.76)	.8 (0.32)	-3.0 (0.77)	-1.6 (0.99)	.5 (0.17)	-1.7 (1.19)
Operative	-9.7 (1.24)	-2.7 (0.42)	-1.9 (0.19)	5.0 (1.23)	-.9 (0.13)	-.2 (0.06)
Nonfarm Labor	-.7 (0.20)	-1.8 (0.66)	6.9 (1.33)	.8 (0.47)	-.9 (0.31)	1.4 (0.88)
Farm Labor	-.7 (0.33)	-.4** (0.23)	.4 (0.16)	2.2 (2.10)	-.4 (0.20)	-.7 (0.68)
Service	-22.0***(2.29)	-15.8 (1.99)	-23.3** (1.94)	1.8 (0.37)	-4.2 (0.50)	-2.5 (0.55)
PHH Service	3.5 (1.43)	1.5 (0.71)	7.1** (2.31)	-1.3 (1.04)	-1.3 (0.60)	-.8 (0.71)
Industry (c**):						
Agriculture	-1.6 (0.55)	-1.9 (0.82)	-.1 (0.02)	1.0 (0.70)	2.5 (1.01)	-1.4 (1.07)
Nondurable Mfg.	-8.3 (1.13)	6.2 (1.03)	-4.3 (0.48)	.2 (0.06)	-10.3 (1.61)	-5.1 (1.48)
Durable Mfg.	3.4 (0.55)	-3.9 (0.75)	9.3 (1.19)	.8 (0.19)	3.0 (0.55)	1.1 (0.72)
Transportation	2.5 (0.53)	1.1 (0.28)	5.6 (0.94)	-.4 (0.16)	12.0***(2.89)	4.0* (1.79)
Trade	-7.3 (0.75)	-7.6 (0.93)	1.9 (0.15)	2.4 (0.48)	-9.7 (1.12)	2.6 (0.56)
Finance	5.9 (0.79)	7.0 (1.13)	6.3 (0.68)	5.3 (1.39)	3.8 (0.59)	5.2 (1.50)
Personal Service	-4.7 (1.00)	-2.4 (0.63)	3.1 (0.53)	-2.2 (0.91)	1.8 (0.43)	-.8 (0.35)
Business/Repair Service	.5 (0.11)	.7 (0.21)	-4.8 (0.89)	-3.5 (1.57)	-1.6 (0.42)	-1.4 (0.70)
Entertainment Service	-2.3 (0.82)	-2.6 (1.10)	-2.4 (0.68)	-1.4 (0.97)	-2.2 (0.90)	-1.4 (1.06)
Professional Service	2.5 (0.25)	1.7 (0.20)	-26.6** (2.11)	-1.2 (0.24)	-3.2 (0.36)	-1.5 (0.31)
Public Administration	9.9 (1.62)	-1.0 (0.21)	4.9 (0.59)	-1.2 (0.38)	4.4 (0.83)	-2.1 (0.73)

* P <= .10 ** P <= .05 *** P <= .01

Note: All estimates are OLS, with controls for SES, AFQT, Northeast, South, West, Rural
Numbers in parentheses are t-ratios unless otherwise indicated.

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The pattern of indirect effects also is generally similar to the pattern for other race/gender groups but differs in some specifics. Educational attainment is about half a year lower for Concentrators, and that reduces earnings by about $.08 per hour and $14 per month. For Concentrator/Explorers, the effect is of almost the same magnitude but works in the opposite direction. The indirect effect through labor market experience operates for all concentrator groups to increase earnings by slightly less than $.08 per hour and $14 per week. For Limited Concentrators the effect of increased tenure works to raise earnings by about $.16 per hour and $28 per week. The effects of a reduced (but imprecise) likelihood to be in a unionized job are reduced earnings for Concentrators by about $.08 per hour. The estimated total differentials are about $.68 per hour and $120 per month for Concentrator/Explorers and about $.25 per hour and $30 per month for Limited Concentrators.

The industrial/occupational patterns of employment are broadly similar to those for white females, although the estimates for industries are imprecise (Table 8).

Perhaps the single most striking characteristic of these results on earnings is their broad similarity among race/gender subgroups. Differentials are larger for males than for females, but positive differentials are associated with training-related employment for all four race/gender groups. Estimated total earnings differentials range from about $.25 per hour and $40 per week for white females to about $1.00 per hour and $170 per week for minority males. The general direction of differentials is similar. Out of 24 coeffecients for the three concentrator categories on both earnings outcomes, 23 are positive and 19 are greater than or equal to 3.7% (although only 7 are statistically signiticant). Out of 12 coeffecients for labor force participation, 8 are positive; for unemployment rates, 10 are negative; for educational attainment, 10 are negative; for labor market experience, 10 are positive. Concentration in secondary vocational education and working in training-related employment are associated with fewer years of education but more months of labor market experience. And the relationship tends to hold for most concentrator categories in all race/gender subgroups. Unionization is uniformly associated with higher earnings, although vocational concentration is not consistently associated with unionized jobs. The three concentrator patterns are usually associated with a lower likelihood of working in professional, managerial, or service occupations and trade and most service industries. But for men concentration is associated with craft

TABLE 9
SUMMARY OF DIRECT AND
TOTAL EFFECTS ON EARNINGS

	Hourly Earnings				Monthly Earnings			
	Direct		Total		Direct		Total	
	%	$	%	$	%	$	%	$
White Male								
Concentrator	11.0	.64	8.5	.49	16.6	177	14.1	150
Limited Concentrator	12.9	.75	18.3	1.06	12.9	138	18.1	193
Concentrator/Explorer	.7	.04	6.6	.38	3.4	36	8.2	87
Vocational/Unrelated	-.3	-.02	-.9	-.05	-1.1	-12	-1.5	-16
Minority Male								
Concentrator	15.7	.84	20.9	1.12	13.7	131	20.2	193
Limited Concentrator	5.6	.30	6.0	.32	2.8	27	3.9	37
Concentrator/Explorer	18.5	.99	27.0	1.44	9.6	91	19.8	189
Vocational/Unrelated	.8	.04	2.5	.13	-.8	-8	1.5	14
White Female								
Concentrator	3.8	.18	2.7	.13	3.4	28	2.4	19
Limited Concentrator	9.9	.47	5.7	.27	7.4	60	2.9	23
Concentrator/Explorer	-3.0	-.14	-3.2	-.15	2.2	18	2.5	20
Vocational/Unrelated	-5.4	.26	-5.1	-.24	-5.5	-45	-5.1	-41
Minority Female								
Concentrator	8.2	.36	5.3	.23	5.8	43	4.0	30
Limited Concentrator	1.4	.06	6.1	.27	6.5	48	11.3	84
Concentrator/Explorer	9.6	.42	15.4	.68	10.1	75	16.4	122
Vocational/Unrelated	4.6	.20	7.6	.33	4.2	31	7.2	53

employment and work in durable goods manufacturing, areas in which jobs have been traditionally better than average. And for women, concentration is associated with working in clerical jobs.

Returning in order to the questions posed earlier in the paper, we offer four principal conclusions. First, contrary to our original expectation, the relatively small total effects found in previous studies on the earnings of males are more likely attributable to imprecise specification of curricula and to neglect of the importance of finding training-related work than to tendencies for conflicting indirect effects to offset each other. Our results concerning the relative magnitudes of earnings effects among males with varying degrees of concentration in vocational education suggest that previous studies may have tended to underestimate the strength of earnings effects for men by failing to differentiate concentration from mere participation or from the number of vocational courses taken. Also, the difference between those in training-related employment and those not is striking. Among all race/sex groups there is evidence of negative indirect differentials on earnings through educational attainment. But these indirect differences are more than offset by differentials associated with direct earnings effects and greater labor market experience (and sometimes with being in a unionized job). Most direct effects on earnings are estimated to be positive and to be reinforced by two of the sources of indirect effects.

Second, our estimates provide some clues to the channels, direct or indirect, through which vocational education affects

these labor market outcomes. Effects for both males and females operate by influencing education, labor market experience, (in some cases) the likelihood of being in a unionized job, and by influencing the occupation and industry in which vocationally educated graduates find work. The greater likelihood that male vocational graduates will work in craft occupations and/or in durable manufacturing and not work in service occupations is probably responsible for the average total earnings advantages estimated for males. For females, the greater tendency to work in clerical or public administration jobs tends to raise concentrators' earnings above the average for all females. Indirect effects through educational attainment act to reduce earnings differentials; the indirect effects through labor market experience work to increase differentials for vocational concentrators working in jobs related to their training.

Third, training-related placement is a significant distinction in estimating earnings differentials. Note how often the category "Vocational-Unrelated" shows no earnings differential compared to a general curriculum and how often it produces differentials in the opposite direction to those estimated for the three concentrator patterns. Disregarding this distinction dilutes estimates of impacts of vocational training.

Fourth, the importance of training-related placement in finding earnings differentials suggests that benefits from vocational education are attributable to occupationally specific skills rather than to general work habits or attitudes. If vocationally educated students acquired better general work habits or

attitudes and if the better habits and attitudes led to higher earnings, the earnings advantages should accrue regardless of whether or not the graduates find training-related employment. That earnings advantages are substantial and are associated primarily with training-related employment suggests strongly that job skills are their source. The job skills may be transferable within a class of occupations rather than being specific to a very narrowly defined job; recall that training-relatedness is defined very broadly here. But it is not defined so broadly as to obliterate the distinction between job-related skills and skills of completely general applicability.

These findings vary somewhat from those of the original research for this project, which was based on 1980 survey data. Those estimates (Gardner, Campbell and Seitz, 1982) conformed more closely to the summary offered in section II. While we are still exploring the reasons for those differences, there are three principal distinctions between those earlier models and the ones reported here. First AFQT scores were not publicly available at the time and could not be included in the model. New estimates that omit AFQT (not shown here) show that its inclusion primarily affects the estimated return to educational attainment, not the returns to vocational concentration. Second, the comparison group in the earlier studies was all students without any vocational courses. It combined what are the general and academic curriculum groups in this study. This second distinction seems in initial exploration to be more important than the

first. What puzzles us is that it does not explain all the differences. We are investigating more closely the roles of both the additional labor market experience acquired and the state of the national economy. The third distinction has already been considered and may well be the most important. It is the recognition of training-relatedness in employment.

The principal policy implications of these results are four. First, for vocational students who find jobs related to their training, the increased earnings associated with vocational concentration would easily pay for the marginal cost of vocational over general education. For a substantial fraction of vocational students, investing in vocational education seems to pay off from the private perspective. Even when rates of training-related emloyment, which are less than 50%, are allowed for, it would appear at a rough guess (reliable marginal cost data are very hard to come by) that a good case could be made that secondary vocational education pays off from the public perspective. The estimated earnings differences seem substantial.

We can give a rough estimate of the importance of these earnings differentials to the economy as a whole. Recently, about 3,000,000 people have graduated from high school each year. Slightly more than half of these are women, but we will assume a simple 50-50 split for these rough estimates. About 80% of the sample is white, and our estimates in other work (Campbell, Orth, and Seitz, 1981) suggest that 8.3% of white men are Concentrators. About 53% of these men (52,800) will find employment

related to their training (Campbell, et. al., 1981). If these men earn, on the average, about $150 per month more than general curriculum graduates (Table 9), the aggregate national increase in earnings associated with this is about $95 million. Remember that this is the figure for white male Concentrators alone, and it is the difference in earnings attributable to taking vocational rather than a general curriculum for those same 52,800 men. Corresponding figures for white female Concentrators (about 156,000, of which at least 82,000 will find training-related employment), whose total estimated monthly earnings differential is about $20, are about $19 million. Corresponding figures for Limited Concentrators are $171 million and $29 million for white men and women, respectively. The cumulative amount is near $300 million for each graduating class in its first year after high school graduation.

We should not make too much of these figures because they are rough estimates only. But we should emphasize that they are very conservative estimates and should serve as a firm lower bound in estimating the monetary benefits provided by high school vocational education. They include only rough approximations of the effects on unemployment or labor-force participation, and for that reason, too, are likely to be conservative. A complete benefit-cost analysis of secondary vocational education programs would have to recognize that these estimates of total benefits are only the first year of a stream of benefits distributed over time. An oft-used conservative business rule-of-thumb for new

investments allows for that by requiring that new investments pay for themselves within five years. If that guide were used here, we should expect the monetary benefits to exceed the costs if the additional costs of providing secondary vocational education programs rather than general curriculum programs for one graduating class (for all four years of school) were less than about $1.5 billion. Because no reliable national cost estimate exists, however, we hesitate to draw sweeping conclusions here. But we feel the estimates provided here are the best to date of the monetary benefits to the national economy from secondary vocational education programs. And we believe that they indicate the rough order of magnitude of the benefits involved.

Second, although attempts are being made to reduce gender stereotypes in vocational education, these data show two clear tendencies that limit our optimism that the stereotypes can be eliminated either quickly or easily. First, enrollments by gender in vocational specialties continue to reflect conformance to gender stereotypes. Female vocational concentrators are overwhelmingly enrolled in business/office programs. Male concentrators are divided about evenly between trade/industry/technical fields and business/office programs (which typically differ in focus from the business/office programs taken by females). Second, the largest earnings advantages accrue to those who follow the stereotypical patterns. Males earn more when they specialize in the trade/industry/technical area and can take positions in craft occupations or in durable manufacturing. Females earn

more than the average for other women when they take clerical positions. But the increased opportunities that have become available in professional/technical, managerial, and even craft and operative occupations for women suggests that vocational education programs for women may have trouble recruiting female students in the near future unless they respond quickly to changing attitudes and preferences. In the future, female students who will be willing to settle for the clerical occupations for which vocational education traditionally has trained them may be fewer and relatively less academically capable than they have been in the past. Vocational education will be severely challenged to provide females with the training that allows them to compete in the new markets now open to them.

Third, the advantages we found to accrue to those who worked in positions related to their training can be realized in the future only if the national economy is strong enough to generate sufficient employment opportunities for all who want to work. Our results suggest that a policy of shifting enrollments toward vocational education and away from general curriculum programs will not be socially productive unless employment is found in jobs related to training. The predominance of vocational concentrators in craft occupations and durable goods manufacturing may foreshadow problems in that regard. The economic sectors experiencing the most severe recent problems include those with heavy proportions of craft occupations and durable manufacturing firms. The vocational education community has little control

over aggregate economic conditions. Hence, a clear commitment by the Federal government to provide a favorable climate for economic growth (and when necessary to take direct action to stimulate growth) is a prerequisite for vocational education to produce favorable outcomes for its graduates.

Fourth, results also contribute to the recent debate on whether secondary vocational education should attempt to teach job skills or very general labor market skills. Our results suggest that earnings advantages accrue to graduates of secondary vocational education because of occupation-specific skills, where occupation is broadly defined, rather than general labor market skills. This finding runs somewhat contrary to the findings of a recent survey by Wilms (1984). From his survey of employer attitudes, Wilms concludes that employers are more interested in having schools provide students who are well-grounded in basics rather than in job-specific skills. Thurow's (1979) view that education develops the ability to learn on the job and reduces training time is consistent with the preferences Wilms finds. Our results suggest, however, that regardless of the preferences shown in Wilms' survey, employers reward more highly those students who have vocational education in areas that are at least somewhat related to their job. Secondary vocational programs apparently can teach occupationally specific skills, for the evidence presented here implies that they have been doing it.

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